

What is Claimed is:

[c1] A photomask material comprising:
a mask blank in the form of a transparent substrate;
an opaque layer directly over and contacting the transparent substrate;
a metal layer directly over and contacting the opaque layer;
a resist layer directly over and contacting the metal layer.

[c2] The photomask material of claim 1 wherein the transparent substrate is made of a material selected from the group consisting quartz, glass, silica glass, polysilicate glass, soda glass, and thin membrane materials made of silicon, SiN, SiC and diamond.

[c3] The photomask material of claim 1 wherein the opaque layer comprises a chrome-based material selected from the group consisting of chrome and Cr:O:N.

[c4] The photomask material of claim 1 wherein the metal layer comprises a material selected from the group consisting of tungsten, tungsten-silicon, tantalum, tantalum-silicon, and copper.

[c5] The photomask material of claim 4 wherein the metal layer has a thickness ranging from about 20 Å... to about 100 Å....

[c6] The photomask material of claim 4 wherein the metal layer comprises a material selected from the group consisting of tungsten and tungsten-silicon, the metal layer having a thickness ranging from about 100 Å... to about 600 Å....

[c7] The photomask material of claim 1 wherein the resist layer has a thickness ranging from about 1000 Å... to about 2000 Å....

[c8] A photomask material comprising:
a transparent glass substrate;
a chrome-based layer directly over and contacting the transparent glass substrate;
a metal layer comprising a material selected from the group consisting of tungsten, tungsten-silicon, tantalum, tantalum-silicon, and copper

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directly over and contacting the chrome-based layer; and
a resist layer directly over and contacting the metal layer.

- [c9] The photomask material of claim 8 wherein the chrome-based layer comprises a material selected from the group consisting of chrome and Cr:O:N deposited to a thickness ranging from about 700 Å... to about 1200 Å....
- [c10] The photomask material of claim 9 wherein the metal layer comprises a material selected from the group consisting of tungsten and tungsten-silicon and is deposited to a thickness ranging from about 20 Å... to about 100 Å....
- [c11] The photomask material of claim 9 wherein the metal layer comprising a material selected from the group consisting of tungsten, tungsten-silicon, tantalum, tantalum-silicon, and copper and is deposited to a thickness ranging from about 100 Å... to about 600 Å....
- [c12] The photomask material of claim 9 wherein the resist layer has a thickness ranging from about 1000 Å... to about 2000 Å....
- [c13] A method of manufacturing a photomask comprising:
 - providing a transparent substrate;
 - depositing an opaque layer directly over and contacting the transparent substrate;
 - depositing a metal layer directly over and contacting the opaque layer;
 - coating a resist layer over the metal layer;
 - imaging the resist layer to form a resist mask pattern thereby exposing portions of the metal layer;
 - etching the exposed portions of the metal layer using a first etchant that etches the metal layer faster than the underlying opaque layer to create a metal layer image; and
 - transferring the metal layer image into underlying exposed portions of the opaque layer using a second etchant that etches the opaque layer faster than the metal layer to form a photomask in the opaque layer.
- [c14] The method of claim 13 further comprising after transferring the metal layer image into the underlying opaque layer, removing any remaining metal layer.

[c15] The method of claim 13 wherein the opaque layer comprises a chrome-based material selected from the group consisting of chrome and Cr:O:N deposited to a thickness ranging from about 700 Å... to about 1200 Å....

[c16] The method of claim 13 wherein the metal layer comprises a material selected from the group consisting of tungsten, tungsten-silicon, tantalum, tantalum-silicon, and copper deposited to a thickness ranging from about 100Å... to about 600Å....

[c17] The method of claim 16 wherein the resist layer is deposited to a thickness ranging from about 1000 Å... to about 2000 Å....

[c18] The method of claim 13 wherein the metal layer comprises a material selected from the group consisting of tungsten and tungsten-silicon deposited to a thickness ranging from about 20 Å... to about 100 Å....

[c19] The method of claim 18 wherein the resist layer is deposited to a thickness ranging from about 1000 Å... to about 2000 Å....

[c20] The method of claim 13 wherein the step of etching exposed portions of the metal layer to form the hard mask image comprises etching the metal layer using an etchant which is highly selective to the metal layer whereby the etchant removes only the metal layer and leaves the underlying opaque layer intact.